GIS AND ITS APPLICATION

AKSHAY PUDKE[1]   **PRATIKSHA DHOMANE[2]**   **VAIDEHI R. DESHMUKH[3]**

Student   studentStudent

J.D.I.E.T Yavatmal

akshaympudke123@gmail.comdhomane46@gmail.comvaidehi.deshmukh4444@gmail.com

Mob. No – 8888706192Mob.No8485871096 Mob no. -- 7038811343

Abstract :-

GIS - Geographic Information Systems (or Science) - is a piece of software that captures geographic data for the purpose of manipulation, viewing and analysis in whichever context and parameters the user desires or needs. It can be used to analyse spatial data or geographic information for any given and possible purpose.

This paper discusses some of thefeatures of a GIS, the general trends in this fieldand the technology behind it. It also describesthe advantages of using multimedia to implementa GIS by extending its capabilities of presentinggeographic and other information. Then the mainsubsystems of a GIS have been presented. Thispaper also identifies some of the key areas whereMultimedia GIS systems could be very useful.

Introduction:-

Geographical Information Systems (GIS) are computer-based systems that enableusers to collect, store, process, analyze andpresent spatial data.It provides an electronic representationof information, called spatial data, about theEarth's natural and man-made features. A GISreferences these real-world spatial data elementsto a coordinate system. These features can beseparated into different **layers**.

A GIS systemstores each category of information in a separate"layer" for ease of maintenance, analysis, andvisualization. For example, layers can representterrain characteristics, census data, demographicsinformation, environmental and ecological data,roads, land use, river drainage and flood plains,and rare wildlife habitats. Different applicationscreate and use different layers. A GIS can alsostore attribute data, which is descriptiveinformation of the map features. This attributeinformation is placed in a database separate fromthe graphics data but is linked to them. A GISallows the examination of both spatial andattribute data at the same time. Also, a GIS letsusers search the attribute data and relate it to the spatial data. Therefore, a GIS can combinegeographic and other types of data to generate maps and reports, enabling users to collect,manage, and interpret location-based information in a planned and systematic way. In short, a GIScan be defined as a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information. GIS systems are dynamic and permitrapid updating, analysis, and display. They usedata from many diverse sources such as satelliteimagery, aerial photos, maps, ground surveys,and global positioning systems (GPS).

GIS DATA TYPES :-

The basic data type in a GIS reflects traditional data found on a map. Accordingly, GIS technology utilizes two basic types of data. These are:

Spatial data

describes the absolute and relative location of geographic features.

Attribute data

describes characteristics of the spatial features. These characteristics can be quantitative and/or qualitative in nature. Attribute data is often referred to as tabular data.

The coordinate location of a forestry stand would be spatial data, while the characteristics of that forestry stand, e.g. cover group, dominant species, crown closure, height, etc., would be attribute data. Other data types, in particular image and multimedia data, are becoming more prevalent with changing technology. Depending on the specific content of the data, image data may be considered either spatial, e.g. photographs, animation, movies, etc., or attribute, e.g. sound, descriptions, narration's, etc.

How Does GIS Work?

The question in the previous section heavily on geographic data and it is estimated that the vast majority of data handled by computers these days has and requires specific geographic parameters. Taking the example of the two restaurants as a starting point, they may look at different data sets:

- The fast food joint may look at maximising their catchment area and accessibility: they will look at busiest roads, the best junction to place at, close to leisure areas such as shopping malls or other non-exclusive entertainment issues - efficiency and maximisation of profit.
- The exclusive restaurant will look primarily at desirability and facilities that best reflect their image. Even though they too will be concerned with maximising their profit, they are less concerned with numbers and more concerned with image. They may appear near other exclusive restaurants, near theatres and other high-class leisure facilities.

Both may use GIS to find the ideal location and can access any number of websites to collect relevant data for their business plan. This information makes it easier to manage what we know and to extrapolate that which is most useful to us based on the widest variety of relevant data. In this respect, GIS is problem solving using geographic means and its co-operative method of sharing pure and unbiased raw data has made it the ideal candidate for everything that affects our environment or how our environment might affect us.

It helps better decision making and as most people prefer visual medium, there is no better visual communication medium than a map so long as you are making it clear

what the person is looking at. Maps are immediately identifiable and engaging, and a flexible and universal method of communication within a discipline, between disciplines and to the public as a whole. How it is compiled comes in four elements which are data acquisition, storage & retrieval, transformation & analysis (which may include statistics and the production of models) and reporting (which will include the maps, tables and any associated reports) of data that may previously have been unrelated but will serve a useful function to someone, somewhere. Not everyone will be involved in all of these processes but most GIS technicians are charged with locating data that is collected by others and need to know how to acquire and manipulate the data as well as produce maps that are useful. It is a co-operative system limited only by the technology of the day.

Real World Example Applications of GIS

1.**GIS in Mapping:** Mapping is a central function of Geographic Information System, which provides a visual interpretation of data. GIS store data in database and then represent it visually in a mapped format. People from different professions use map to communicate. It is not necessary to be a skilled cartographer to create maps. Google map, Bing map, Yahoo map are the best example for web based GIS mapping solution.

2.Surveying: Surveying is the measurement of location of objects on the earth's surfaces. Land survey is measuring the distance and angles between different points on the earth surface. An increasing number of national and governments and regional organizations are using GNSS measurements. GNSS is used for topographic surveys where a centimetre level accuracy is provided. These data can be incorporated in the GIS system. GIS tools can be used to estimate area and also, digital maps can prepared.

3. Urban Planning: GIS technology is used to analyze the urban growth and its direction of expansion, and to find suitable sites for further urban development. In order to identify the sites suitable for the urban growth, certain factors have to consider which is: land should have proper accessibility, land should be more or less flat, land should be vacant or having low usage value presently and it should have good supply of water.

4. Transportation Planning: GIS can be used in managing transportation and logistical problems. If transport department is planning for a new railway or a road route then this can be performed by adding environmental and topographical data into the GIS platform. This will easily output the best route for the transportation based on the criteria like flattest route, least damage to habitats and least disturbance from local people. GIS can also help in monitoring rail systems and road conditions.

5. Agricultural Applications: GIS can be used to create more effective and efficient farming techniques. It can also analyze soil data and to determine: what are the best crop to plant?, where they should go? how to maintain nutrition levels to best benefit

crop to plant?. It is fully integrated and widely accepted for helping government agencies to manage programs that support farmers and protect the environment. This could increase food production in different parts of the world so the world food crisis could be avoided.

6. GIS Applications in Geology: Geologists use GIS in a various applications. The GIS is used to study geologic features, analyze soils and strata, assess seismic information, and or create three dimensional (3D) displays of geographic features. GIS can be also used to analyze rock information characteristics and identifying the best dam site location.

7. GIS for Wildlife Management: Man made destruction such as habitat loss, pollution, invasive species introduction, and climate change, are all threats to wildlife health and biodiversity. GIS technology is an effective tool for managing, analyzing, and visualizing wildlife data to target areas where international management practices are needed and to monitor their effectiveness. GIS helps wildlife management professionals examine and envision.

Future of GIS:-
As discussed above, many disciplinescan benefit from GIS techniques. An active GISmarket has resulted in lower costs and continualimprovements in the hardware and softwarecomponents of GIS. These developments will, inturn, result in a much wider application of thetechnology throughout government, business,and industry.
It is quite likely that the future GISsystems of the future will include the additionaldimension of time, giving researchers the abilityto examine the variations in Earth processes overdays, months and years.The advances in computer hardware, software and remote

sensing technology willlead to more and more GIS adopting multimediato represent data. These GIS systems coupled
with the multimedia technologies will result in apowerful and richer presentation of informationand ideas to stimulate interest and enhanceinformation retention. The GIS of the future willalso be more user friendly and accessible to thecommon man.

Conclusions :-
GIS in essence is an applied science,and I believe that while the GIS vendorcommunity, hardware and software vendors,provide us with newer, better and fastertechnological tools, it is in the end, the domainspecialists applying the tool that define state-ofthe-art. The heartbeat of GIS still lies in the fieldand district offices, the logging divisions, theengineering offices, and with the small GISentrepreneurs in offices everywhere who will beapplying this technology in their field of work.

References :-

1. Geographical Information Systems . An Overview
Arul Prakash

2. Principal of Geographical Information Systems
Otto HuismanAnd Rolf A. De

3.Fundamentals of Geographic InformationSystem
PROF. DR. Yuji Murayama

4. Application of Geographic Information System (GIS) in sustainable groundwater development
Michael A. Nwachukwu